REMARKS

The final Office Action of April 11,2008, has been received and reviewed.

Claims 1-25 are currently pending and under consideration in the above-referenced application, each standing rejected.

Reconsideration of the above-referenced application is respectfully requested.

Rejections under 35 U.S.C. § 102

Claims 1-11 and 15-19 have been rejected under 35 U.S.C. § 102(e).

A claim is anticipated only if each and every element, as set forth in the claim, is found, either expressly or inherently described, in a single reference which qualifies as prior art under 35 U.S.C. § 102. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

With respect to inherency, M.P.E.P. § 2112 provides:

> The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish inherency of that result or characteristic. *In re Rijckaert,* 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993) . . . 'To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill . . .'' *In re Robertson,* 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1991).

Hudson

Claims 1-11 and 15-19 have been rejected under 35 U.S.C. § 102(e) for being drawn to subject matter that is purportedly anticipated by the subject matter described in U.S. Patent 5,972,792 to Hudson (hereinafter "Hudson").

Independent claim 1 recites a substantially abrasive-free slurry for use in polishing a copper structure of a semiconductor device. The slurry is formulated to substantially concurrently polish copper and a barrier material. As amended and presented herein,

independent claim 1 requires that the barrier material comprise tungsten. The tungsten is removed at substantially the same rate as or at a slower rate than copper is removed.

Hudson discloses a number of different abrasive-free slurries that are useful with fixed-abrasive polishing pads. The slurries of Hudson are useful for planarizing films that have been formed from a variety of different materials. *See, e.g.,* col. 22-25. For example, one of the slurries described in Hudson removes tungsten. Col. 4, lines 34-49. Another of the slurries described in Hudson removes copper. Col. 4, lines 56-65.

In rejecting claims 1-11 and 15-19, the Office has asserted, "[s]ince Hudson uses a composition that is substantially free of abrasives..., then using Hudson's slurry in the same manner claimed in the present invention would inherently result in" the subject matter recited in each of claims 1-11 and 15-19. Final Office Action of April 11, 2008, page 2. It is apparent from this assertion that the Office does not appreciate the fact that the description of Hudson is limited to *different* slurries that are formulated to remove *different* materials; *i.e.,* one of the slurries of Hudson removes tungsten, while a completely different slurry removes copper.

It is also apparent from the Office's assertion that the Office has overlooked the fact that a large number of factors in addition to the basic components of a slurry determine whether a slurry will be useful for removing one or more particular materials, as well as in determining the rates at which a particular slurry formulation oxidizes and/or removes one or more materials. The disclosure of Hudson supports this point by pointing out that a slurry of one specific formulation and an accompanying set of properties will remove tungsten, while the removal of copper requires another slurry with a completely different formulation and significantly different properties. More specifically, the slurries of Hudson that are able to remove tungsten are weak acids (*e.g.,* have pHs of 4.5, or below 5.0) (col. 4, lines 34-41), while the slurries of Hudson that remove copper are not weak acids; they are either strongly acidic (*i.e.,* have pHs of less than approximately 2.5) or a strongly basic (*e.g.,* have pHs of more than approximately 10.5) (col. 4, lines 56-59). Further, there are significant differences in the components of the different slurries that are described in Hudson. The slurries of Hudson that remove tungsten include as oxidants one or more of ferric nitrate, hydrogen peroxide, potassium iodate, and bromine. Col. 4, lines 36-37. Completely different oxidants are used in the slurries of Hudson that remove

copper: nitric acid and ethanol; nitric acid and benzotriazole; ammonium hydroxide; or ammonia ferricyanide. Col. 4, lines 60-65.

Although Hudson mentions that a slurry formulated for the removal of tungsten may be used to planarize "a multi-level film stack with different metals (e.g., titanium and aluminum on a tungsten plug) and a barrier layer (e.g., titanium nitride)" (col. 4, lines 22-25), Hudson does not expressly describe a single slurry that is formulated to remove both copper and tungsten. Consequently, Hudson also lacks any express description of a slurry that removes tungsten at substantially the same rate or at a slower rate than copper is removed, as required by amended independent claim 1.

Nor has the Office met its burden of supplying extrinsic evidence, as set forth in M.P.E.P. § 2112, to support the assertion that any slurry disclosed in Hudson would necessarily remove copper and tungsten in the manner required by independent claim 1. Therefore, Hudson does not inherently describe a slurry that that removes tungsten at substantially the same rate or at a slower rate than copper is removed.

As such, it is respectfully submitted that Hudson does not anticipate each and every element of independent claim 1, as would be required to maintain the 35 U.S.C. § 102(e) rejection against amended independent claim 1.

Each of claims 2-11 and 15-19 is allowable, among other reasons, for depending either directly or indirectly from independent claim 1, which is allowable.

Claim 2 is also allowable since Hudson provides no express or inherent description of a slurry that is formulated for use with a polishing pad that includes fixed aluminum dioxide, titanium dioxide, silicon dioxide, or cerium dioxide abrasive particles.

Claim 3 is additionally allowable since Hudson neither expressly nor inherently describes a slurry that is formulated to oxidize copper at substantially the same rate as or at a faster rate than a barrier material is oxidized.

Claim 4 is further allowable because Hudson does not expressly or inherently describe a slurry in which copper and a barrier material have substantially the same oxidation energies.

Claim 5 depends from claim 4 and is also allowable since Hudson includes no express or inherent description of a slurry in which a barrier material has an oxidation energy of about 0.25 V more to about 0.20 V less than an oxidation energy of copper.

Claim 6 is further allowable since Hudson lacks any express or inherent description of a slurry in which a rate of removal of a barrier material is up to about ten times slower than a rate of removal of copper.

Claim 7 is additionally allowable because Hudson includes no express or inherent description of a slurry in which a rate of removal of a barrier material is about two to about four times slower than a rate of removal of copper.

Claim 8 is also allowable since Hudson neither expressly nor inherently describes a slurry that is formulated to remove copper and a barrier material without substantially dissolving barrier material that underlies remaining portions of copper.

Withdrawal of the 35 U.S.C. § 102(a) rejections of claims 1-11 and 15-19 is respectfully solicited, as is the allowance of each of these claims.

Rejections under 35 U.S.C. § 103(a)

Claims 12-14 and 20-25 are rejected under 35 U.S.C. § 103(a).

There are several requirements in establishing a *prima facie* case of obviousness against the claims of a patent application. All of the limitations of the claim must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 985 (CCPA 1974); *see also* MPEP § 2143.03. Even then, a claim "is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art." *KSR Int'l Co. v. Teleflex Inc.*, 82 USPQ2d 1396 (2007). The Office must also establish that one of ordinary skill in the art would have had a reasonable expectation of success that the purported modification or combination of reference teachings would have been successful. *In re Merck & Co., Inc.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986). There must also be "an apparent reason to combine the known elements in the fashion claimed by the patent at issue." *KSR* at 1396. That reason must be found in the prior art, common knowledge, or derived from the nature of the problem itself, and not based on the Applicant's

disclosure. *DyStar Textilfarben GmbH & Co. Deutschland KG v. C. H. Patrick Co.*, 464 F.3d 1356, 1367 (Fed. Cir. 2006). A mere conclusory statement that one of ordinary skill in the art would have been motivated to combine or modify reference teachings will not suffice. *KSR* at 1396.

Hudson in View of Nakazato

Claims 12-14 and 21-25 stand rejected under 35 U.S.C. § 103(a) for reciting subject matter which is assertedly unpatentable over that taught in Hudson as applied to claim 1 above, and further in view of teachings from U.S. Patent 4,459,216 to Nakazato et al. (hereinafter "Nakazato").

Claims 12-14 and 21-25 are each allowable, among other reasons, for depending directly or indirectly from claim 1, which is allowable.

Moreover, it is respectfully submitted that Hudson teaches away from dissolving conductive material while oxidizing and polishing the same. Col. 4, lines 1-19, and col. 5, lines 55-64. In contrast, Nakazato teaches that "[a]n object of the present invention is to provide a chemical dissolving solution having a good dissolving capacity for various kinds of metal." Col. 2, lines 33-35. In this regard, the mere fact that Nakazato supplies teachings that are missing from Hudson is insufficient to overcome the fact that Hudson teaches away from the asserted combination. As Hudson teaches away from the asserted combination of its teachings with those of Nakazato, it is respectfully submitted that one of ordinary skill in the art wouldn't have been motivated to combine the teachings of these references in the asserted manner.

Therefore, a *prima facie* case of obviousness has not been established against any of claims 12-14 and 21-25 under 35 U.S.C. § 103(a).

Hudson in View of Suzuki

Claim 20 stands rejected under 35 U.S.C. § 103(a) for reciting subject matter which is allegedly unpatentable over the subject matter taught in Hudson and, further, in view of teachings from U.S. Patent 5,885,334 to Suzuki et al. (hereinafter "Suzuki").

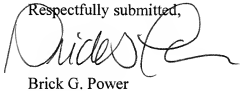
Claim 20 is allowable, among other reasons, for depending indirectly from claim 1, which is allowable.

It is respectfully requested that the 35 U.S.C. § 103(a) rejections of claims 12-14 and 20-25 be withdrawn, and that each of these claims be allowed.

CONCLUSION

It is respectfully submitted that each of claims 1-25 is allowable. An early notice of the allowability of each of these claims is respectfully solicited, as is an indication that the above-referenced application has been passed for issuance. If any issues preventing allowance of the above-referenced application remain which might be resolved by way of a telephone conference, the Office is kindly invited to contact the undersigned attorney.

Respectfully submitted,



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